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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,721	02/24/2004	Daniel Yap	B-4664NP 621523-9	2756

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EXAMINER	
LEUNG, WAI LUN	
ART UNIT	PAPER NUMBER
2613	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/786,721	YAP, DANIEL	
	Examiner	Art Unit	
	Danny Wai Lun Leung	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18,23-25,30-32 and 37* is/are rejected.

7)☒ Claim(s) *19-22,26-29 and 33-36* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *see attached*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1449 mail dates:
4/14/2005
1/23/2006
4/11/2006
10/27/2006

DETAILED ACTION

Priority

1. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged.

Information Disclosure Statement

2. Each of excessive number of references listed on the numerous IDS filed by Applicant has been briefly considered in the time allotted for examination of the patent application. However, in response to this Office Action, Applicant is requested to point out the 20 most relevant references that contain subject matter that is closest to the claimed invention and to provide a concise explanation of the relevance of each of the references so that a more thorough review of the most relevant references may be performed.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1, 6, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by **Mizrahi et al.** *(US006341025B1)*.

Regarding to claim 1, **Mizrahi** discloses a multi-wavelength photonic oscillator *(fig 2A)* comprising: (a) a plurality of lasers *(transmitter 20, fig 2A)* each emitting light at a different frequency *(λ_1, λ_2, λ_3,... λ_n, fig 2A)*; (b) an optical wavelength multiplexer *(30, fig 2A)* for combining the light emitted by the plurality of lasers at an output thereof as a set of optical wavelengths *(40, fig 2A)*; and (c) an optical modulator *(50, fig 2A)* arranged in a feedback loop and coupled to receive light at the output of the optical wavelength multiplexer *(as shown in fig 2A)*, the feedback loop further including: (i) an optical tap *(221, fig 5)* for coupling at least a subset of said set of optical wavelengths to at least one optical output of the multi-wavelength photonic modulator *(col 14, ln 31-45)*; (ii) at least one optical channel having an associated photodetector *(231, fig 5)* arranged to receive light from the optical tap via the at least one optical channel *(col 14, ln 43-ln 45)*; and (iii) an electronic loop portion coupled to receive output from the at least one associated photodetector and to provide an input for the optical modulator *(col 14, ln 43-57)*.

As to claim 6, **Mizrahi** further teaches wherein the optical tap is wavelength sensitive for directing light of a wavelength associated with a frequency of one of the lasers of said plurality of lasers into said feedback loop and for directing light of wavelengths associated with frequencies of other ones of the lasers of said plurality of lasers to said at least one optical output of the multi-wavelength photonic modulator *(col 14, ln 17-57; fig 5)*.

As to claim 11, **Mizrahi** further teaches wherein said feedback loop includes a plurality of parallel-arranged optical channels *(161, 165, fig 2B)* and wherein the optical tap is wavelength sensitive for directing light of wavelengths associated with frequencies of said plurality of lasers each into different ones of optical channels of said feedback loop *(col 10, ln 43-61)*.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2, 7, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mizrahi et al.** *(US006341025B1)*, in view of **Desurvire** *(US006556322B1)*.

Regarding claims 2, 7, and 12, **Mizrahi** discloses the apparatus in accordance to claims 1, 6, and 11 as discussed above. **Mizrahi** does not disclose expressly wherein the feedback loop has a plurality of optical channels with one optical channel imposing more delay than another optical channel with each associated photodetector in the plurality of optical channels having an output combined at a common electrical output for connection to said electronic loop portion.

Desurvire, from the same field of endeavor, teaches an apparatus having a plurality of optical channels *(F3, F4, F5, F6, fig 1)* with one optical channel imposing more delay than another optical channel *(delay 115, 116, 117, 118, fig 1)* with each associated photodetector *(119-122, fig 1)* in the plurality of optical channels having an output combined at a common electrical output for connection to an electronic loop *(col 5, ln 7-12)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to implement **Mizrahi's** feedback loop with a plurality of optical channels with one optical channel imposing more delay than another optical channel with each associated photodetector in the plurality of optical channels having an output combined at a common electrical output for connection to said

electronic loop portion as suggested by **Desurvire**. The motivation for doing so would have been to be able to effectively identify the channels that contains optical signals *(Desurvire, col 4, ln 23-34)*.

7. Claims 3-5, 8-10, and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mizrahi et al.** *(US006341025B1)*, in view of **Desurvire** *(US006556322B1), as applied to claims 2 and 7 above,* and further in view of **Applicant's admitted prior art**.

Regarding claims 3, 8, and 13, **the combination of Mizrahi and Desurvire** discloses the apparatus in accordance to claims 2 and 7 as discussed above. **Mizrahi** further teaches wherein at least one of an optical portion of the loop and the electronic loop portion includes an amplifier to ensure a loop gain for the feedback loop *(col 10, ln 17-27)*. **The combination** does not disclose expressly wherein the loop gain for the feedback loop is ensured to exceed unity. **However applicant admitted** that it is common and well known to have at least one of an optical portion of the loop and the electronic loop portion includes an amplifier to ensure that a loop gain for the feedback loop exceeds unity *(page 2, ln 1-7 of spec)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to ensure the loop gain for the feedback loop in the combination of **Mizrahi and Desurvire**'s system to exceed unity as it is common and well known. The motivation for doing so would have been to have a stabled feedback control system.

As to claims 4, 9, and 15, **Desurvire** further teaches wherein at least one of the optical portion of the loop and the electronic loop portion includes phase shifting means *(123, fig 1)*.

As to claims 14 and 16, **Mizrahi** further teaches wherein each optical channel in the optical portion of the loop has an optical amplifier *(53, fig 2A and fig 5)*.

As to claims 5, 10, and 17, **Desurvire** further teaches wherein the input for the optical modulator is an electronic input *(input to optical gates 127-130 are electronic inputs R1-4, fig 1; col 4, ln 58-60).* The combination of **Mizrahi and Desurvire** does not expressly teaches wherein the electronic loop portion includes a bandpass filter. However, **Desurvire** teaches wherein the electronic loop portion includes electronics that validates the available channel, and "any other combination of type of gate producing the required logic function could be used" *(col 4, ln 54-55).* Therefore, it would have been obvious for a person of ordinary skill in the art to use a bandpass filter, or electronic gates that are functionally equivalent to a bandpass filter, onto **the combination of Mizrahi, Desurvire, and Applicant's admission**, such that a wavelength channel of a particular passband could be verified as suggested by **Desurvire**.

8. Claims 24 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Shimonaka** *(US005548434A)*, in view of **Scarr et al.** *(US4601027).*

Regarding claims 24 and 31, **Shimonaka** discloses an apparatus *(fig 7)* comprising: (a) optical modulators *(66, fig 7)* for modulating optical local oscillator signals *(30, fig 7)*; (b) photodetectors *(35, fig 7)* coupled to outputs of the optical modulators; and (c) an apparatus for generating the optical local oscillator signals *(30, fig 7).*

Shimonaka does not disclose expressly wherein the photodetectors are for converting the modulated optical local oscillator signals to an electrical intermediate frequency or baseband signal or electrical radio frequency signals for subsequent processing, or the apparatus for generating the optical local oscillator signals comprising: (i) multi-wavelength photonic oscillator; and (ii) a wavelength division demultiplexer coupled to an optical output of the multi-wavelength photonic oscillator, said wavelength division demultiplexer separating the optical

output into more than one wavelength region with the optical output at each wavelength region comprising at least an optical carrier and a modulation sideband, the output at each wavelength region being suitable for determining a local oscillator frequency.

Scarr, from the same field of endeavor, teaches an apparatus *(fig 2)* for generating the optical local oscillator signal, comprising: (i) multi-wavelength photonic oscillator *(Master oscillator)*; and (ii) a wavelength division demultiplexer *(RNM1, fig 2)* coupled to an optical output of the multi-wavelength photonic oscillator, said wavelength division demultiplexer separating the optical output into more than one wavelength region *(f_0-1000MHz, f_0-500MHz, f_0, f_0+500MHz, f_0+1000MHz, fig 2),* with the optical output at each wavelength region comprising at least an optical carrier and a modulation sideband *(fig 1),* the output at each wavelength region being suitable for determining a local oscillator frequency *(col 3, ln 29-54)*; and photodetectors *(detectors fig 2)* for converting the modulated optical local oscillator signals to an electrical intermediate frequency or baseband signal for subsequent processing *(col 3, ln 62-col 4, ln 4)*

Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to apply **Scarr's** teachings onto **Shimonaka**'s system, such that **Shimonaka's** local oscillator comprises an apparatus such as that of **Scarr's** for generating multiple wavelength regions comprising at least an optical carrier and a modulation sideband, suitable for determining a local oscillator frequency as suggested by **Scarr**. The motivation for doing so would have been to be able to afford a relatively expensive oscillator with good spectral line width *(Scarr, col 3, ln 2-8)*.

9. Claims 18 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mizrahi et al.** *(US006341025B1)*, in view of **Scarr et al.** *(US4601027)*, and further in view of **applicant's admitted prior art**.

Regarding claim 18, **Mizrahi** discloses the apparatus in accordance to claim 1 as discussed above. **Mizrahi** does not disclose expressly having (d) a wavelength division demultiplexer coupled to the at least one optical output of the multi-wavelength photonic oscillator; and (e) a plurality of slave lasers arranged as pairs of slave lasers, each pair of slave lasers being wavelength-associated with a laser of said plurality of lasers in said multi-wavelength photonic oscillator and being coupled to said multi-wavelength photonic oscillator via said wavelength division demultiplexer. **Scarr**, from the same field of endeavor, teaches an apparatus comprising (d) a wavelength division demultiplexer *(RNM 1, fig 2)* coupled to the at least one optical output of the multi-wavelength photonic oscillator *(Master oscillator, fig 2)*.. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to apply **Scarr's** teachings onto **Mizrahi**'s system, such that **Mizrahi's** local oscillator comprises a wavelength division demultiplexer coupled to the at least one optical output of the multi-wavelength photonic oscillator as suggested by **Scarr**. The motivation for doing so would have been to be able to afford a relatively expensive oscillator with good spectral line width *(Scarr, col 3,-ln 2-8)*. **The combination of Mizrahi and Scarr** does not disclóse expressly having (e) a plurality of slave lasers arranged as pairs of slave lasers, each pair of slave lasers being wavelength-associated with a laser of said plurality of lasers in said multi-wavelength photonic oscillator and being coupled to said multi-wavelength photonic oscillator via said wavelength division demultiplexer. However, **Applicant admitted** that it is common and well

known to use a pair of lasers to generate an optical heterodyne output suitable for generating a RF LO signal *(page 13, ln 19-21 of specification)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to arrange a plurality of slave lasers as pairs of slave lasers onto **the combination of Mizrahi and Scarr**'s system, each pair of slave lasers as being wavelength-associated with a laser of said plurality of lasers in **the combination of Mizrahi and Scarr**'s multi-wavelength photonic oscillator and being coupled to **Scarr's** multi-wavelength photonic oscillator via **Scarr's** wavelength division demultiplexer, as suggested by **applicant's admission**. The motivation for doing so would have been to apply a common and well known beam forming technique onto the **combination of Mizrahi and Scarr's system** for providing a different digital beam forming signal for each antenna.

As to claim 23, **Appliant's admission** further teaches the apparatus in combination with a radar or other communication system having optical modulators for modulating signals transmitted thereby, the pairs of slave lasers each producing a local oscillator signal for modulation by the optical modulators in said radar or other communication system is common and well known *(page 3, ln 1-15)*.

10. Claims 25 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Shimonaka** *(US005548434A)*, in view of **Scarr et al.** *(US4601027), as applied to claims 24 and 31 above,* and further in view of **Applicant's admitted prior art**.

Regarding claims 25 and 32, **the combination of Shimonaka and Scarr** discloses the apparatus in accordance to claims 24 and 31 as discussed above. **It** does not disclose expressly wherein the apparatus for generating the optical local oscillator signals further comprises a plurality of slave lasers arranged as pairs of slave lasers, each pair of slave lasers being

wavelength-associated with said multi-wavelength photonic oscillator and being coupled to said multi-wavelength photonic oscillator via said wavelength division demultiplexer. However, **Applicant admitted** that it is common and well known to use a pair of lasers to generate an optical heterodyne output suitable for generating a RF LO signal *(page 13, ln 19-21 of specification)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to arrange a plurality of slave lasers as pairs of slave lasers, onto **the combination of Shimonaka and Scarr**'s system, each pair of slave lasers as being wavelength-associated with a laser of said plurality of lasers in **the combination of Shimonaka and Scarr**'s multi-wavelength photonic oscillator and being coupled to **Scarr's** multi-wavelength photonic oscillator via **Scarr's** wavelength division demultiplexer, as suggested by **applicant's admission**. The motivation for doing so would have been to apply a common and well known beam forming technique onto the **combination of Shimonaka and Scarr's system** for providing a different digital beam forming signal for each antenna.

11. Claims 30 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Shimonaka** *(US005548434A)*, in view of **Scarr et al.** *(US4601027), as applied to claims 24 and 31 above,* and further in view of **Mizrahi et al.** *(US006341025B1).*

Regarding claims 30 and 37, **the combination of Shimonaka and Scarr** discloses the apparatus in accordance to claims 24 and 31 as discussed above. **It** does not disclose expressly wherein the multi-wavelength photonic oscillator comprises: (1) a plurality of lasers each emitting light at a different frequency; (2) an optical wavelength multiplexer for combining the light emitted by the plurality of lasers at an output thereof as a set of optical wavelengths; and (3) an optical modulator arranged in a feedback loop and coupled to receive light at the output of the

optical wavelength multiplexer, the feedback loop further including: an optical tap for coupling at least a subset of said set of optical wavelengths to at least one optical output of the multi-wavelength photonic modulator; at least one optical channel having an associated photodetector arranged to receive light from the optical tap via the at least one optical channel; and an electronic loop portion coupled to receive output from the at least one associated photodetector and to provide an input for the optical modulator. **Mizrahi**, from the same field of endeavor, teaches the multi-wavelength photonic oscillator as discussed above regarding claim 1. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to use **Mizrahi**'s multi-wavelength photonic oscillator as discussed above regarding claim 1 onto **the combination of Shimonaka and Scarr**'s system as suggested by **Mizrahi**. The motivation for doing so would have been to enable a feedback loop such as that of **Mizrahi's** to stabilize the multi-wavelength photonic oscillator.

Allowable Subject Matter

12. Claims 19-22, 26-29, and 33-36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Danny Wai Lun Leung whose telephone number is (571) 272-5504. The examiner can normally be reached on 9:30am-9:00pm Mon-Thur.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

March 26, 2007
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